Instructions: Try these problems from the textbook as practice (answers below).

Problems

9-14. Find a vector $\mathbf{a}$ with representation given by the directed line segment $\overrightarrow{AB}$. Draw $\overrightarrow{AB}$ and the equivalent representation starting at the origin.

9. $A(-2,1), B(1,2)$
11. $A(3,-1), B(2,3)$
13. $A(0,3,1), B(2,3,-1)$

15-18. Find the sum of the given vectors and illustrate geometrically.

15. $\langle -1,4\rangle$, $\langle 6,-2\rangle$
17. $\langle 3,0,1\rangle$, $\langle 0,8,0\rangle$

19-22. Find $\mathbf{a}+\mathbf{b}$, $4\mathbf{a}+2\mathbf{b}$, $|\mathbf{a}|$, and $|\mathbf{a}-\mathbf{b}|$.

19. $\mathbf{a}=\langle -3,4\rangle$, $\mathbf{b}=\langle 9,-1\rangle$
21. $\mathbf{a}=4\mathbf{i}-3\mathbf{j}+2\mathbf{k}$, $\mathbf{b}=2\mathbf{i}-4\mathbf{k}$

41. Find the unit vectors that are parallel to the tangent line to the parabola $y=x^2$ at the point $(2,4)$.

43. If A, B, and C are the vertices of a triangle, find $\overrightarrow{AB}+\overrightarrow{BC}+\overrightarrow{CA}$.

45. (a) Draw the vectors $\mathbf{a}=\langle 3,2\rangle$, $\mathbf{b}=\langle 2,-1\rangle$, and $\mathbf{c}=\langle 7,1\rangle$.
    (b) Show, by means of a sketch, that there are scalars s and t such that $\mathbf{c}=s\mathbf{a}+t\mathbf{b}$.
    (c) Use the sketch to estimate the values of s and t.
    (d) Find the exact values of s and t.

Answers

9. $\overrightarrow{AB} = \langle 3, 1 \rangle$

11. $\overrightarrow{AB} = \langle -1, 4 \rangle$

13. $\overrightarrow{AB} = \langle 2, 0, -2 \rangle$

15. $\langle 5, 2 \rangle$

17. $\langle 3, 8, 1 \rangle$

19. $\langle 6, 3 \rangle$, $\langle 6, 14 \rangle$, 5, 13

21. $6\mathbf{i} - 3\mathbf{j} - 2\mathbf{k}$, $20\mathbf{i} - 12\mathbf{j}$, $\sqrt{29}$, 7

41. $\pm(\mathbf{i} + 4\mathbf{j})/\sqrt{17}$

43. $\mathbf{0}$

45. $s = \frac{9}{7}$, $t = \frac{11}{7}$